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(71)Applicant : KOITO MFG CO LTD

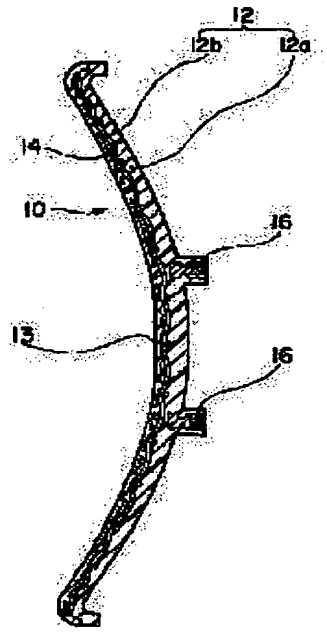
(72)Inventor : DAICHO HISAYOSHI
YOSHIMOTO YUJI

(54) ELECTROMAGNETIC WAVE REFLECTOR AND ITS MANUFACTURE

(57)Abstract:

PURPOSE: To provide the electromagnetic reflector (antenna reflector) with translucency without a sense of pressing.

CONSTITUTION: An electromagnetic reflecting layer 14 is made up of a metallic net 32 in an antenna reflecting plate where the electromagnetic reflecting layer 14 of a curved shape almost traced with an antenna base 12 is integrally buried in the curved synthesis resin made antenna base 12. Moreover, the antenna base 12 is made of a transparent member to avoid problems such as a background seen through the antenna reflecting plate 10 and unsunny state caused by the antenna reflecting plate 10, and a sense of release is considerably improved in comparison with a conventional opaque antenna reflecting plate.



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CLAIMS

[Claim(s)]
[Claim 1] The electromagnetic wave reflector characterized by said antenna substrate consisting of transparence material while said electromagnetic wave reflector layer is made into light transmission mesh structure at this antenna substrate in the electromagnetic wave reflector by which the laying-under-the-ground unification of the electromagnetic wave reflector layer of a ******** curve configuration was carried out into the straight antenna substrate made of synthetic resin.
[Claim 2] The electromagnetic wave reflector according to claim 1 characterized by forming in the front face by the side of the electromagnetic wave reflector of said antenna substrate the minute irregularity to which scattered reflection of the light is carried out.
[Claim 3] To the convex side of the 1st bright film made of sheet-like synthetic resin fabricated in the configuration where the curved-surface configuration by the side of the concave surface of the curve antenna substrate which it is going to fabricate was imitated The laminating of the conductive metal mesh-like electromagnetic wave reflector lamination object fabricated in the shape of isomorphism is carried out to said film. Furthermore, on it, it is formed in the gate of metal mold at the magnitude which carries out abbreviation adjustment, and the laminating of the 2nd bright film made of sheet-like synthetic resin for electromagnetic wave reflector layer deformation prevention which prevents deformation of the electromagnetic wave reflector layer by the injection pressure of the melting resin injected from the gate is carried out. The 2nd film for this electromagnetic wave reflector layer deformation prevention is welded [1st]. Unify the 1st film and an electromagnetic wave reflector lamination object, and the layered product of the 1st unified film and the unified electromagnetic wave reflector lamination object the 1st film sticks to a metal mold shaping side -- as -- injection molding -- public funds -- the manufacture approach of the electromagnetic wave reflector characterized by arranging in a mold, and injecting and fabricating the synthetic resin which is a transparence antenna substrate component in metal mold.
[Claim 4] The manufacture approach of the electromagnetic wave reflector according to claim 3 characterized by forming minute irregularity in the shaping side of an antenna substrate of the shaping side of said metal mold which forms a concave surface side at least, and forming the minute irregularity for making coincidence carry out scattered reflection of the light to shaping of an antenna substrate on the front face of an antenna substrate.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the electromagnetic wave reflector by which the laying-under-the-ground unification of the electromagnetic wave reflector layer was carried out like the parabolic antenna used for satellite broadcasting service etc. into the antenna substrate made of synthetic resin fabricated by the predetermined curve configuration, and its manufacture approach.
[0002]
[Description of the Prior Art] The antenna for satellite broadcasting services has the structure where the formation unification of the protective layer 3 for the electromagnetic wave reflector layer 2 to raise weatherability on it further was carried out, on the front face of the parabolic antenna substrate 1 made of resin with which the resin ingredient was generally fabricated by pressing, as shown in drawing 7 . And in order to form this electromagnetic wave reflector, the wire gauze which is the configuration member of the electromagnetic wave reflector layer 2, and the nonwoven fabric by which the vacuum plating of aluminium was carried out are beforehand cut out in a predetermined configuration, or what carried out spinning of the aluminum plate to the predetermined configuration is prepared, and it piles up with a resin ingredient, pressurizes and fabricates to one. And generally as a resin ingredient used, the SMC (Seat molding compound) ingredient is used.
[0003] And JP,5-18283,B is proposed as the manufacture approach of this conventional kind of antenna. This fabricates the antenna substrate which formed the conductive layer 4 which is arranging the film 4 made of synthetic resin which formed the conductive layers 5, such as metallic foil metallurgy group vacuum evaporationo, in metal mold 6, and injecting melting resin in metal mold 6 and 6 from gate 6a, and is an electromagnetic wave reflector layer, as shown in drawing 8 . Moreover, how to arrange and carry out injection molding of what formed the film 4 in the both sides of a conductive layer 5 into metal mold 6 and 6 is also explained to this JP,5-18283,B (refer to drawing 9).
[0004]
[Problem(s) to be Solved by the Invention] However, since the above mentioned conventional antenna consisted of opaque material, when it installed in a veranda or a place by the window, scenery was interrupted, or sunny worsened and it had the problem that it was accompanied by the feeling of oppression. Moreover, by the 1st manufacture approach shown in above mentioned drawing 8 , a conductive layer 5 may be deformed or damaged with the injection pressure of the melting resin injected from gate 6a. In addition, although a possibility that the problem of damaging the conductive layer 5 which was described above may arise will decrease if the injection speed of melting resin is made late, another problem that a forming cycle takes time amount so much arises.
[0005] Moreover, since the melting resin injected from gate 6a does not hit a conductive layer 5 directly by the 2nd manufacture approach shown in drawing 9 , although there is neither deformation of a conductive layer 5 nor fear of breakage, in order to give translucency to an antenna When porosity is formed in a conductive layer 5, that melting resin turns between a film 4 and 4 takes time amount, or the problem that air bubbles remain between a film 4 and 4 arises.
[0006] This invention was made in view of the trouble of said conventional technique, and the 1st purpose is in offering the electromagnetic wave reflector which has translucency and does not have a feeling of oppression. Moreover, the 2nd purpose is to offer the manufacture approach of an electromagnetic wave reflector that have translucency, there is no feeling of oppression, and the point

converging [electromagnetic wave] serves as an abbreviation fixed location.
[0007]
[Means for Solving the Problem] In order to attain said purpose, while the electromagnetic wave reflector layer of a ******** curve configuration makes said electromagnetic wave reflector layer light transmission mesh structure in the electromagnetic wave reflector concerning claim 1 at this antenna substrate in the electromagnetic wave reflector by which laying-under-the-ground unification was carried out into the straight antenna substrate made of synthetic resin, said antenna substrate consists of transparence material. In claim 2, the minute irregularity to which the front face by the side of the electromagnetic wave reflector of said antenna substrate is made to carry out scattered reflection of the light is formed in an electromagnetic wave reflector according to claim 1. In the manufacture approach of the electromagnetic wave reflector concerning claim 3 To the convex side of the 1st bright film made of sheet-like synthetic resin fabricated in the configuration where the curved-surface configuration by the side of the concave surface of the curve antenna substrate which it is going to fabricate was imitated The laminating of the conductive metal mesh-like electromagnetic wave reflector lamination object fabricated in the shape of isomorphism is carried out to said film. Furthermore, on it, it is formed in the gate of metal mold at the magnitude which carries out abbreviation adjustment, and the laminating of the 2nd bright film made of sheet-like synthetic resin for electromagnetic wave reflector layer deformation prevention which prevents deformation of the electromagnetic wave reflector layer by the injection pressure of the melting resin injected from the gate is carried out. The 2nd film for this electromagnetic wave reflector layer deformation prevention is welded [1st]. Unify the 1st film and an electromagnetic wave reflector lamination object, and the layered product of the 1st unified film and the unified electromagnetic wave reflector lamination object the 1st film sticks to a metal mold shaping side -- as -- injection molding -- public funds -- it arranges in a mold, and the synthetic resin which is a transparence antenna substrate component is injected, and it is made to fabricate in metal mold In claim 4, in the manufacture approach of an electromagnetic wave reflector according to claim 3, minute irregularity is formed in the shaping side of an antenna substrate of the shaping side of said metal mold which forms a concave surface side at least, and the minute irregularity for making coincidence carry out scattered reflection of the light to shaping of an antenna substrate on the front face of an antenna substrate is formed.
[0008]
[Function] In claim 1, since each electromagnetic wave reflector layer currently laid underground in the antenna substrate which constitutes an electromagnetic wave reflector, and the antenna substrate can make light penetrate, an electromagnetic wave reflector has translucency. Although there is a possibility that the electromagnetic wave reflector layer (antenna substrate) may serve as a configuration (for example, parabola mold) which brings the reflected electromagnetic wave together in one point, the light which was reflected on the front face of an antenna substrate for this reason may also gather for the point converging [electromagnetic wave], and this condensing point may serve as high temperature, in claim 2 With the minute irregularity currently formed in the front face of an antenna substrate, light is reflected irregularly, is scattered about, condenses especially in the point converging [electromagnetic wave], and does not serve as an elevated temperature. Although the greatest injection pressure acts on the location facing the gate of an electromagnetic wave reflector layer in claim 3 in order that the melting resin injected in metal mold from the gate may flow the inside of metal mold along with a mesh-like electromagnetic wave reflector layer, after hitting at right angles to the location facing the gate of an electromagnetic wave reflector layer, this maximum injection pressure is distributed by the sheet-like film of a wrap 2nd in an electromagnetic wave reflector layer. moreover, the melting resin injected from the gate does not have the electromagnetic wave reflector layer of the shape of the periphery section of the 2nd film to a mesh, after colliding with the 2nd sheet-like film of the magnitude which carries out abbreviation adjustment of the electromagnetic wave reflector layer at the wrap gate -- it is alike, and since it flows, it fills up with melting resin smoothly in an electromagnetic wave reflector layer. In claim 4,

the minute irregularity formed in the metal mold shaping side is imprinted at the antenna substrate side which is a Plastic solid at the time of shaping of an antenna substrate.

[0009]

[Example] Next, the example of this invention is explained based on a drawing. Drawing 1 shows the 1st example of the electromagnetic wave reflector concerning this invention, and is the sectional view of the reflecting plate for parabola mold antennas. In this drawing, a sign 12 is the transparent antenna substrate made of polycarbonate (henceforth PC) resin formed in the parabola mold, in this antenna substrate 12, the laying-under-the-ground unification of the electromagnetic wave reflector layer 14 which fabricated the wire gauze of conductive metal of stainless steel, aluminum, brass, and others in the parabola mold is carried out, and the antenna reflecting plate 10 is constituted. If it puts in another way, it has the structure where the tooth-back side of the electromagnetic wave reflector layer 14 of a parabola mold was covered with backup layer 12a made of PC resin resin, and the front-face side was covered with surface protective layer 12b made of PC resin, respectively. Moreover, a sign 16 is the nut for antenna substrate supporter material attachment immobilization embedded at backup layer 12a of the antenna substrate 12.

[0010] The wire gauze which is the electromagnetic wave reflector layer 14 is set as 40% or more of numerical aperture, in order to be 10-80 meshes between 0.05-1mm of wire sizes, and a line and to acquire sufficient translucency from both sides of not becoming an increase of weight and not reducing structure reinforcement again. Moreover, as an electromagnetic wave reflector layer 14, as what is replaced with a wire gauze, when conductive metallic foils, such as aluminum which prepared many holes, may be used, for example, it uses aluminium foil, in order to be 1-3.5mm in the thickness of 0.05-1mm, 0.5-2.5mm of apertures, and hole spacing and to acquire sufficient translucency from both sides of weight and reinforcement, it is desirable to set it as 40% or more of numerical aperture.

[0011] Moreover, the electromagnetic wave reflector layer 14 of a parabola mold is the structure (structure protected by surface protective layer 12b of homogeneity thickness) laid under the fixed depth from the front face of the antenna substrate 12 of a parabola mold by the shaping approach mentioned later. The converging point that the electromagnetic wave which the weatherability of the electromagnetic wave reflector layer 14 is excellent in upwards, and was reflected by the electromagnetic wave reflector layer 14 converges does not vary greatly every manufactured antenna reflecting plate 10, but is correctly set as the front predetermined location of the antenna substrate 12.

[0012] The front face 13 by the side of the front face of the antenna substrate 12 of a parabola mold is formed of the crimp processing processing side with a depth of 50-1000 micrometers, carries out scattered reflection of the light in respect of [13] this crimp processing processing, and has structure which light does not condense at the point converging [electromagnetic wave]. That is, although the light reflected on the front face of a substrate 12 will also condense at the point converging [electromagnetic wave] in the antenna substrate 12 of a parabola mold, since scattered reflection of the light is carried out by the crimp which is the minute irregularity currently formed in the front face of a substrate 12, there is no fault which light converges on the point converging [electromagnetic wave], and also says high temperature suddenly.

[0013] Next, the production process of the antenna reflecting plate 10 shown in drawing 1 is explained based on drawing 2 - drawing 6 . First, PC resin sheet object which is the 1st sheet-like bright film which constitutes surface protective layer 12b of the electromagnetic wave reflector layer 14 is fabricated as shown in drawing 2 . That is, as shown in (a), the plate-like transparence PC resin sheet plate 20 of magnitude predetermined with the given thickness (for example, 0.5mm) which applied the weatherproof coating to one side is prepared. Subsequently, after fabricating in the predetermined parabola mold which makes a weatherproof coating spreading side a convex, as are shown in (b), and it has a periphery frame for this PC resin sheet plate 20 with a vacuum forming machine 21, and it is shown in (c), PC resin sheet object 22 is formed by carrying out cutting removal of the surrounding garbage.

[0014] On the other hand, in parallel to PC resin sheet object forming cycle shown in drawing 2 , the wire gauze which is the electromagnetic wave reflector layer 14 is fabricated in a predetermined configuration by the wire gauze forming cycle shown in drawing 3 . That is, as shown in (a), the wire gauze 30 with flat predetermined magnitude is prepared. Subsequently, as shown in (b), after fabricating this wire gauze 30 in the predetermined parabola mold adjusted with the press machine 31 in the curved-surface configuration (curved-surface configuration of said PC resin sheet object 22) of an antenna substrate, as shown in (c), the wire gauze 32 of the predetermined configuration adjusted on PC resin sheet object 22 is formed by carrying out cutting removal of the surrounding garbage.
[0015] Furthermore, in parallel to PC resin sheet object forming cycle shown in drawing 2 , and the wire gauze forming cycle shown in drawing 3 , as shown in drawing 4 , PC resin patch for wire gauze deformation prevention which is 2nd PC resin bright film is fabricated. That is, as shown in (a), the transparence PC resin sheet plate 40 of given thickness (for example, 0.5mm) is prepared, and as shown in (b), minute irregularity 40a with a depth of about 0.1mm is formed in the front face of this PC resin sheet plate 40 with the 200-degree C heat press machine 41. Subsequently, as shown in (c), PC resin patch 42 for wire gauze deformation prevention is formed by clipping in a somewhat larger circle configuration than the gate 52 (refer to drawing 6) established in the antenna substrate molding die 50.
[0016] As shown in drawing 5 , next, on PC resin sheet object 22 fabricated by the forming cycle shown in drawing 2 2nd PC resin patch 42 fabricated by the forming cycle which carries out the laminating of the wire gauze 32 fabricated by the forming cycle shown in drawing 3 , and is further shown in drawing 4 It carries so that a concave convex may come a wire gauze 32 side on the abbreviation center section of the wire gauze 32 used as the location which stands face to face against the gate 52 which carries out opening to the center section of shaping side 50b of metal mold 50, and ultrasonic welding of the PC resin patch 42 is carried out to PC resin sheet object 22 with the ultrasonic welding machine 60. The contact section of the heights of PC resin patch 42 and PC resin sheet object 22 welds with the vibrational energy of the supersonic wave which acts, and the fixed unification of the layered product of PC resin sheet object 22 and a wire gauze 32 is carried out.
[0017] Next, while arranging so that PC resin sheet object 22 may stick the layered product of this PC resin sheet object 22 and wire gauze 32 by which fixed unification was carried out in metal mold 50 at shaping side 50a of metal mold 50 as shown in drawing 6 A nut 16 is arranged in metal mold 50, and the reflecting plate 10 (antenna substrate 12) for antennas shown in drawing 1 is fabricated by injecting melting PC resin in metal mold 50 and 50 from the gate 52.
[0018] Since it flows along with a wire gauze 32 as shown in the drawing 6 arrow head after injecting the melting PC resin supplied to the gate 52 from the resin supply nozzle 54 in metal mold 50 and 50 from the gate 52 and being perpendicularly in charge of PC resin patch 42, the biggest injection pressure acts on the part facing the gate 52 of a wire gauze 32. However, there is no fault which a wire gauze 32 deforms this maximum injection pressure with injection pressure in order for PC resin sheet object 40 to distribute with PC resin patch 42 by which joining unification is carried out and to act on a wire gauze 32, or is damaged.
[0019] Moreover, since injection molding is carried out in the condition that the wire gauze 32 has been arranged by this example approach in the location which separated the parabola mold PC resin sheet object 22 of predetermined thickness beforehand in metal mold 50, The wire gauze 32 which is the electromagnetic wave reflector layer 14 extends in the fixed depth from the front face 13 of the fabricated antenna substrate 12, and the point that the point as a design converging [electric-wave] is the same to all the reflecting plates for antennas obtained and manufactured converging [electric-wave] is guaranteed.
[0020]
[Effect of the Invention] Since an electromagnetic wave reflector has translucency according to the electromagnetic wave reflector concerning claim 1 so that clearly from the above explanation, there is outstanding effectiveness that the feeling of freedom which scenery is interrupted by the

electromagnetic wave reflector, or there is no fault, like sunny worsens, and is not in the conventional electromagnetic wave reflector is acquired. Since according to claim 2 light reflects irregularly with the minute irregularity currently formed in the front face of an antenna substrate and it is scattered about, there is no fault which condenses especially in the point converging [electromagnetic wave], and serves as an elevated temperature. According to the manufacture approach of the electromagnetic wave reflector concerning claim 3, since the injection pressure by the melting resin injected in metal mold from the gate is distributed by the sheet-like film of a wrap 2nd in an electromagnetic wave reflector layer, the deformation and breakage of an electromagnetic wave reflector layer at the time of shaping of an antenna substrate are prevented. Moreover, since the injected melting resin can flow into the gate smoothly in an electromagnetic wave reflector layer from the periphery marginal location of the 2nd sheet-like film of the magnitude which carries out abbreviation adjustment, its injection time of the resin into metal mold is short, and there is also no possibility that air bubbles may remain in the top where **** time amount is short at an electromagnetic wave reflector layer in a forming cycle so much. Moreover, since the surface protective layer formed in the concave surface side of an electromagnetic wave reflector layer is constituted by the 1st sheet-like bright film beforehand held in metal mold, the curved-surface configuration of an electromagnetic wave reflector layer turns into the configuration where the concave bend side of the fabricated antenna substrate was imitated correctly, and can fabricate an electromagnetic wave reflector with the point of an abbreviation same location converging [electromagnetic wave]. Since the minute irregularity to which scattered reflection of the light is carried out can be formed in the concave surface side of an antenna substrate at shaping of an antenna substrate and coincidence according to claim 4, minute irregularity surface treatment becomes unnecessary after shaping of an antenna substrate.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The sectional view of the reflecting plate for parabolic antennas which is one example of the electromagnetic wave reflector concerning this invention
[Drawing 2] Drawing showing the forming cycle of PC resin sheet object
[Drawing 3] Drawing showing the forming cycle of a wire gauze
[Drawing 4] Drawing showing the forming cycle of PC resin patch for wire gauze deformation prevention
[Drawing 5] Drawing explaining the joining process which carries out the fixed unification of PC resin sheet object and the wire gauze
[Drawing 6] Drawing explaining the forming cycle of the reflecting plate for antennas (antenna substrate)
[Drawing 7] The conventional antenna substrate is an expanded sectional view a part.
[Drawing 8] The sectional view showing the conventional antenna substrate shaping approach

[Drawing 9] The sectional view showing the conventional antenna substrate shaping approach

[Description of Notations]

10 Reflecting Plate for Antennas

12 Antenna Substrate made of Transparence PC Resin

13 Crimp Processing Side Which is Minute Irregularity Forming Face

14 Electromagnetic Wave Reflector Which is Electromagnetic Wave Reflector Layer of Light Transmission Mesh Structure

22 PC Resin Sheet Object Which is 1st Bright Film made of Sheet-like Synthetic Resin

32 Wire Gauze Which is Electromagnetic Wave Reflector Layer

42 PC Resin Patch Which is 2nd Bright Film made of Sheet-like Synthetic Resin

50 Metal Mold

52 Gate

[Translation done.]

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(71)出願人　000001133
株式会社小糸製作所
東京都港区高輪４丁目８番３号

(72)発明者　大長　久芳
静岡県清水市北脇500番地　株式会社小糸製作所静岡工場内

(72)発明者　吉本　侑司
静岡県清水市北脇500番地　株式会社小糸製作所静岡工場内

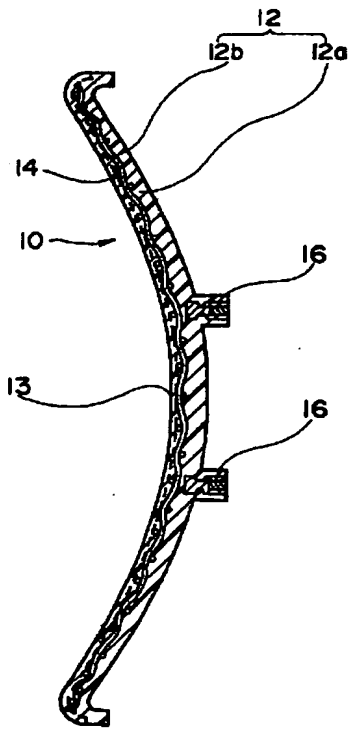
(74)代理人　弁理士　八木　秀人

(54)【発明の名称】　電磁波反射体およびその製造方法

(57)【要約】

【目的】　透光性をもち圧迫感のない電磁波反射体（アンテナ反射板）の提供。

【構成】　湾曲する合成樹脂製アンテナ基板１２内に、アンテナ基板１２に略倣った湾曲形状の電磁波反射材層１４が埋設一体化されたアンテナ反射板で、電磁波反射材層１４を金網３２によって構成するとともに、アンテナ基板１２を透明材によって構成することで、アンテナ反射板１０を通して背景が透けて見えるとかアンテナ反射板１０によって日当たりが悪くなることがなくなって、従来の不透光性のアンテナ反射板に比べて解放感が格段に向上する。



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【特許請求の範囲】

【請求項１】　湾曲する合成樹脂製アンテナ基板内にこのアンテナ基板に略倣った湾曲形状の電磁波反射材層が埋設一体化された電磁波反射体において、前記電磁波反射材層が透光メッシュ構造とされるとともに、前記アンテナ基板が透明材で構成されたことを特徴とする電磁波反射体。

【請求項２】　前記アンテナ基板の電磁波反射面側の表面には、光を乱反射させる微小凹凸が形成されたことを特徴とする請求項１記載の電磁波反射体。

【請求項３】　成形しようとする湾曲アンテナ基板の凹面側の曲面形状に倣った形状に成形した第１のシート状合成樹脂製透明フィルムの凸面側に、前記フィルムと同形状に成形した導電性金属製メッシュ状の電磁波反射材層構成体を積層し、さらにその上に、金型のゲートに略整合する大きさに形成され、ゲートから射出される溶融樹脂の射出圧による電磁波反射材層の変形を防止する電磁波反射材層変形防止用の第２のシート状合成樹脂製透明フィルムを積層し、この電磁波反射材層変形防止用の第２のフィルムを第１のフィルムに溶着して、第１のフィルムと電磁波反射材層構成体とを一体化し、一体化した第１のフィルムと電磁波反射材層構成体との積層体を、第１のフィルムが金型成形面に密着するように射出成形用金型内に配置し、金型内に透明アンテナ基板構成材である合成樹脂を射出して成形することを特徴とする電磁波反射体の製造方法。

【請求項４】　前記金型の成形面の、アンテナ基板の少なくとも凹面側を形成する成形面には、微小凹凸が形成されており、アンテナ基板の成形と同時にアンテナ基板の表面に光を乱反射させるための微小凹凸を形成することを特徴とする請求項３記載の電磁波反射体の製造方法。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は衛星放送等に用いられるパラボラアンテナ等のように、所定の湾曲形状に成形された合成樹脂製アンテナ基板内に電磁波反射材層が埋設一体化された電磁波反射体およびその製造方法に関する。

【０００２】

【従来の技術】衛星放送用のアンテナは、図７に示されるように、一般に樹脂材料が加圧成形により成形された樹脂製パラボラアンテナ基板１の表面に電磁波反射材層２が、さらにその上に耐候性を向上させるための保護層３が形成一体化された構造となっている。そしてこの電磁波反射体を形成するには、電磁波反射材層２の構成部材である金網やアルミニウム蒸着された不織布を所定形状に予め裁断したり、アルミニウム板を所定形状に絞り加工したものを用意しておき、樹脂材料と重ね合わせて加圧して一体に成形する。そして使用される樹脂材料と

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しては、一般にSMC（Ｓｅａｔ　ｍｏｌｄｉｎｇ　ｃｏｍｐｏｕｎｄ）材料が用いられている。

【０００３】そして従来のこの種のアンテナの製造方法としては、特公平５－１８２８３号が提案されている。これは、図８に示すように、金属箔や金属蒸着等の導電層５を設けた合成樹脂製フィルム４を、金型６内に配置し、ゲート６ａから溶融樹脂を金型６，６内に射出することで、電磁波反射材層である導電層４を設けたアンテナ基板を成形するというものである。またこの特公平５－１８２８３号には、導電層５の両側にフィルム４を設けたものを、金型６，６内に配置して射出成形する方法も説明されている（図９参照）。

【０００４】

【発明の解決しようとする課題】しかし、前記した従来のアンテナは、不透明材で構成されているため、ベランダや窓際に設置した場合に、風景がさえぎられたり、日当たりが悪くなったりして、圧迫感を伴うという問題があった。また前記した図８に示す第１の製造方法では、ゲート６ａから射出される溶融樹脂の射出圧によって導電層５が変形したり破損したりする場合がある。なお、溶融樹脂の射出速度を遅くすれば、前記したような導電層５を傷つけるという問題が生じるおそれは少なくなるが、それだけ成形工程に時間がかかるという別の問題が生じる。

【０００５】また図９に示す第２の製造方法では、ゲート６ａから射出された溶融樹脂が導電層５に直接当たらないため、導電層５の変形や破損のおそれはないものの、アンテナに透光性をもたせるために、導電層５に多孔を形成した場合には、溶融樹脂がフィルム４，４間に回り込むのに時間がかかるとか、フィルム４，４間に気泡が残存するといった問題が生じる。

【０００６】本発明は前記従来技術の問題点に鑑みなされたもので、その第１の目的は、透光性をもち圧迫感のない電磁波反射体を提供することにある。また第２の目的は、透光性をもち圧迫感がなく、電磁波集束点が略一定位置となる電磁波反射体の製造方法を提供することにある。

【０００７】

【課題を解決するための手段】前記目的を達成するために、請求項１に係わる電磁波反射体においては、湾曲する合成樹脂製アンテナ基板内にこのアンテナ基板に略倣った湾曲形状の電磁波反射材層が埋設一体化された電磁波反射体において、前記電磁波反射材層を透光メッシュ構造とするとともに、前記アンテナ基板を透明材で構成するようにしたものである。請求項２においては、請求項１記載の電磁波反射体において、前記アンテナ基板の電磁波反射面側の表面に、光を乱反射させる微小凹凸を形成するようにしたものである。請求項３に係わる電磁波反射体の製造方法においては、成形しようとする湾曲アンテナ基板の凹面側の曲面形状に倣った形状に成形し

た第１のシート状合成樹脂製透明フィルムの凸面側に、前記フィルムと同形状に成形した導電性金属製メッシュ状の電磁波反射材層構成体を積層し、さらにその上に、金型のゲートに略整合する大きさに形成され、ゲートから射出される溶融樹脂の射出圧による電磁波反射材層の変形を防止する電磁波反射材層変形防止用の第２のシート状合成樹脂製透明フィルムを積層し、この電磁波反射材層変形防止用の第２のフィルムを第１のフィルムに溶着して、第１のフィルムと電磁波反射材層構成体とを一体化し、一体化した第１のフィルムと電磁波反射材層構成体との積層体を、第１のフィルムが金型成形面に密着するように射出成形用金型内に配置し、金型内に透明アンテナ基板構成材である合成樹脂を射出して成形するようにしたものである。請求項４においては、請求項３記載の電磁波反射体の製造方法において、前記金型の成形面の、アンテナ基板の少なくとも凹面側を形成する成形面に、微小凹凸が形成されており、アンテナ基板の成形と同時にアンテナ基板の表面に光を乱反射させるための微小凹凸を形成するようにしたものである。

【０００８】

【作用】請求項１では、電磁波反射体を構成するアンテナ基板およびアンテナ基板内に埋設されている電磁波反射材層はいずれも光を透過させることができるので、電磁波反射体は透光性をもつ。請求項２では、電磁波反射材層（アンテナ基板）は、反射した電磁波を１点に集める形状（例えばパラボラ型）となっており、このためアンテナ基板の表面で反射した光も電磁波集束点に集って、この集光点が高温度となるおそれがあるが、光はアンテナ基板の表面に形成されている微小凹凸で乱反射して散乱し、電磁波集束点において特に集光して高温となることはない。請求項３では、ゲートから金型内に射出された溶融樹脂は、電磁波反射材層のゲートに臨む位置に垂直に当たった後、メッシュ状の電磁波反射材層に沿って金型内を流動するため、電磁波反射材層のゲートに臨む位置に最大の射出圧が作用するが、この最大射出圧は、電磁波反射材層を覆う第２のシート状フィルムによって分散される。またゲートから射出された溶融樹脂は、電磁波反射材層を覆うゲートに略整合する大きさの第２のシート状フィルムに衝突した後、第２のフィルムの周縁部からメッシュ状の電磁波反射材層ないに流入するので、電磁波反射材層内に溶融樹脂がスムーズに充填される。請求項４では、金型成形面に形成された微小凹凸が、アンテナ基板の成形時に成形体であるアンテナ基板側に転写される。

【０００９】

【実施例】次に、本発明の実施例を図面に基づいて説明する。図１は本発明に係わる電磁波反射体の第１の実施例を示すもので、パラボラ型アンテナ用反射板の断面図である。この図において、符号１２は、パラボラ型に形成された透明なポリカーボネイト（以下、ＰＣという）

樹脂製のアンテナ基板で、このアンテナ基板１２内には、ステンレス，アルミニウム，黄銅その他の導電性金属製の金網をパラボラ型に成形した電磁波反射材層１４が埋設一体化されて、アンテナ反射板１０が構成されている。換言すれば、パラボラ型の電磁波反射材層１４の背面側は、ＰＣ樹脂樹脂製のバックアップ層１２ａによって、前面側は、ＰＣ樹脂製の表面保護層１２ｂによってそれぞれ被覆された構造となっている。また符号１６は、アンテナ基板１２のバックアップ層１２ａに埋め込まれたアンテナ基板支持部材取付固定用のナットである。

【００１０】電磁波反射材層１４である金網は、重量増とならずまた構造強度を低下させないという両面から、線径０．０５～１mm，線間１０～８０メッシュで、十分な透光性を得るために、４０％以上の開口率に設定されている。また電磁波反射材層１４としては、金網に代わるものとして、多数の孔を設けたアルミニウム等の導電性金属箔を使用してもよく、例えばアルミニウム箔を使う場合は、重量と強度の両面から、肉厚０．０５～１mm，孔径０．５～２．５mm，穴間隔１～３．５mmで、十分な透光性を得るために、４０％以上の開口率に設定することが望ましい。

【００１１】またパラボラ型の電磁波反射材層１４は、後述する成形方法によって、パラボラ型のアンテナ基板１２の表面から一定の深さに埋設された構造（均一厚さの表面保護層１２ｂによって保護された構造）で、電磁波反射材層１４の耐候性が優れる上に、電磁波反射材層１４によって反射された電磁波の集束する集束点が、製造されたアンテナ反射板１０毎に大きくばらつかず、アンテナ基板１２の前方所定位置に正確に設定されている。

【００１２】パラボラ型のアンテナ基板１２の前面側の表面１３は、深さ５０～１０００μmのしぼ加工処理面によって形成されており、このしぼ加工処理面１３で光を乱反射させて、電磁波集束点に光が集光しない構造となっている。即ち、パラボラ型のアンテナ基板１２では、基板１２の表面で反射した光も電磁波集束点に集光することになるが、基板１２の表面に形成されている微小凹凸であるしぼによって光が乱反射されるため、電磁波集束点に光が集束して高熱をもつという不具合がない。

【００１３】次に、図１に示すアンテナ反射板１０の製造工程を図２～図６に基づいて説明する。まず、電磁波反射材層１４の表面保護層１２ｂを構成する第１のシート状透明フィルムであるＰＣ樹脂シート体を、図２に示すように成形する。即ち、（ａ）に示すように、耐候性塗料を片面に塗った所定厚さ（例えば０．５mm）で所定の大きさの平板状の透明ＰＣ樹脂シート板２０を用意する。次いで、（ｂ）に示すように、このＰＣ樹脂シート板２０を真空成形機２１により、周縁枠をもち、耐候

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性塗料塗布側を凸面とする所定のパラボラ型に成形した後、（ｃ）に示すように、周辺の不要部分を切断除去することで、ＰＣ樹脂シート体２２を形成する。

【００１４】一方、図２に示すＰＣ樹脂シート体成形工程と並行して、図３に示す金網成形工程によって電磁波反射材層１４である金網を所定形状に成形する。即ち、（ａ）に示すように、所定の大きさの平坦な金網３０を用意する。次いで、（ｂ）に示すように、この金網３０をプレス機３１によってアンテナ基板の曲面形状（前記ＰＣ樹脂シート体２２の曲面形状）に整合する所定のパラボラ型に成形した後、（ｃ）に示すように、周辺の不要部分を切断除去することで、ＰＣ樹脂シート体２２に整合する所定形状の金網３２を形成する。

【００１５】さらに、図２に示すＰＣ樹脂シート体成形工程，図３に示す金網成形工程と並行して、図４に示すように、第２のＰＣ樹脂透明フィルムである金網変形防止用ＰＣ樹脂パッチを成形する。即ち、（ａ）に示すように、所定厚さ（例えば０．５ｍｍ）の透明ＰＣ樹脂シート板４０を用意し、（ｂ）に示すように、このＰＣ樹脂シート板４０の表面に、２００℃の熱プレス機４１によって、深さ０．１ｍｍ程度の微小凹凸４０ａを形成する。次いで、（ｃ）に示すように、アンテナ基板成形用金型５０に設けられているゲート５２（図６参照）より一回り大きい円形状に切り抜くことで、金網変形防止用ＰＣ樹脂パッチ４２を形成する。

【００１６】次に、図５に示すように、図２に示す成形工程で成形したＰＣ樹脂シート体２２の上に、図３に示す成形工程で成形した金網３２を積層し、さらに図４に示す成形工程で成形した第２のＰＣ樹脂パッチ４２を、金型５０の成形面５０ｂの中央部に開口するゲート５２に対峙する位置となる金網３２の略中央部の上に凹凸面が金網３２側となるように載せて、超音波溶着機６０によってＰＣ樹脂パッチ４２をＰＣ樹脂シート体２２に超音波溶着する。ＰＣ樹脂パッチ４２の凸部とＰＣ樹脂シート体２２との接触部が、作用する超音波の振動エネルギーにより溶着して、ＰＣ樹脂シート体２２と金網３２との積層体が固定一体化される。

【００１７】次に、図６に示すように、金型５０内に、この固定一体化されたＰＣ樹脂シート体２２と金網３２との積層体を、ＰＣ樹脂シート体２２が金型５０の成形面５０ａに密着するように配置するとともに、ナット１６を金型５０内に配置し、溶融ＰＣ樹脂をゲート５２から金型５０，５０内に射出することで、図１に示すアンテナ用反射板１０（アンテナ基板１２）を成形する。

【００１８】樹脂供給ノズル５４からゲート５２に供給された溶融ＰＣ樹脂は、ゲート５２から金型５０，５０内に射出してＰＣ樹脂パッチ４２に垂直に当たった後に、図６矢印に示すように、金網３２に沿って流動することから、金網３２のゲート５２に臨む部位に最も大きな射出圧が作用する。しかし、この最大射出圧は、ＰＣ

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樹脂シート体４０に溶着一体化されているＰＣ樹脂パッチ４２によって分散されて金網３２に作用するため、金網３２が射出圧によって変形したり破損したりする不具合はない。

【００１９】また本実施例方法では、金型５０内において、予め所定厚さのパラボラ型ＰＣ樹脂シート体２２を隔てた位置に金網３２が配置された状態で射出成形されるため、電磁波反射材層１４である金網３２は、成形されたアンテナ基板１２の表面１３から一定深さに延在して、設計通りの電波集束点が得られ、製造されたアンテナ用反射板すべてに同一の電波集束点が保証される。

【００２０】

【発明の効果】以上の説明から明らかなように、請求項１に係る電磁波反射体によれば、電磁波反射体が透光性をもつので、電磁波反射体によって風景が遮られたり、日当たりが悪くなる等の不具合がなく、従来の電磁波反射体にはない解放感が得られるという優れた効果がある。請求項２によれば、アンテナ基板の表面に形成されている微小凹凸により光が乱反射して散乱するため、電磁波集束点において特に集光して高温となる不具合がない。請求項３に係る電磁波反射体の製造方法によれば、ゲートから金型内に射出された溶融樹脂による射出圧は、電磁波反射材層を覆う第２のシート状フィルムによって分散されるので、アンテナ基板の成形時の電磁波反射材層の変形や破損が防止される。また射出された溶融樹脂は、ゲートに略整合する大きさの第２のシート状フィルムの外周縁位置から電磁波反射材層内にスムーズに流入できるので、金型内への樹脂の充填時間が短く、それだけ成形工程に要す時間が短い上に、電磁波反射材層に気泡が残存するおそれもない。また電磁波反射材層の凹面側に形成された表面保護層は、金型内に予め収容した第１のシート状透明フィルムによって構成されるので、電磁波反射材層の曲面形状は、成形されたアンテナ基板の凹曲面に正確に倣った形状となって、略同一位置の電磁波集束点をもつ電磁波反射体を成形できる。請求項４によれば、アンテナ基板の成形と同時にアンテナ基板の凹面側に光を乱反射させる微小凹凸を形成できるので、アンテナ基板の成形後に微小凹凸表面加工が不要となる。

【図面の簡単な説明】

【図１】本発明に係わる電磁波反射体の一実施例であるパラボラアンテナ用反射板の断面図

【図２】ＰＣ樹脂シート体の成形工程を示す図

【図３】金網の成形工程を示す図

【図４】金網変形防止用ＰＣ樹脂パッチの成形工程を示す図

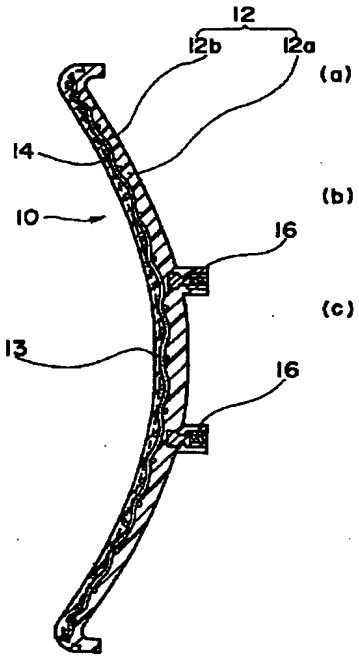
【図５】ＰＣ樹脂シート体と金網とを固定一体化する溶着工程を説明する図

【図６】アンテナ用反射板（アンテナ基板）の成形工程を説明する図

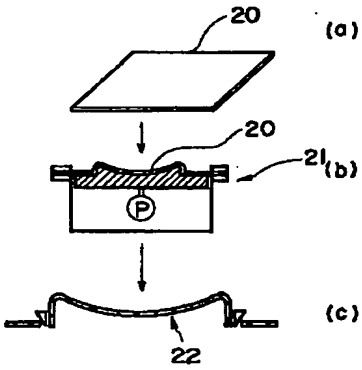
【図７】従来のアンテナ基板の一部拡大断面図
【図８】従来のアンテナ基板成形方法を示す断面図
【図９】従来のアンテナ基板成形方法を示す断面図
【符号の説明】
１０　アンテナ用反射板
１２　透明ＰＣ樹脂製アンテナ基板
１３　微小凹凸形成面であるしぼ加工面
１４　透光メッシュ構造の電磁波反射材層である電磁波

反射体
２２　第１のシート状合成樹脂製透明フィルムであるＰＣ樹脂シート体
３２　電磁波反射材層である金網
４２　第２のシート状合成樹脂製透明フィルムであるＰＣ樹脂パッチ
５０　金型
５２　ゲート

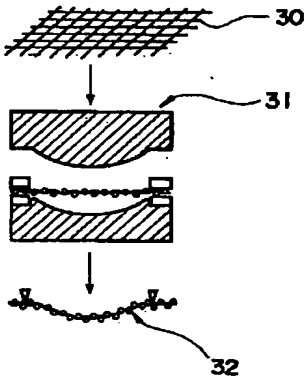
【図１】



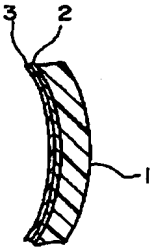
【図２】



【図３】



【図７】



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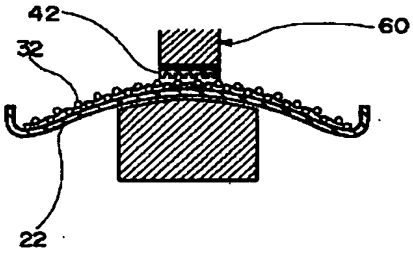

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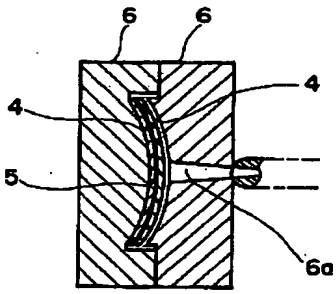

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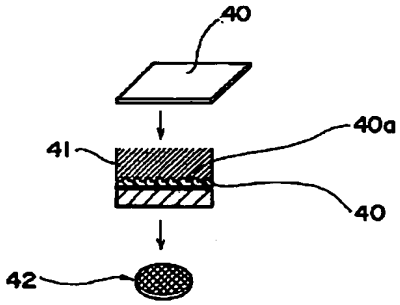

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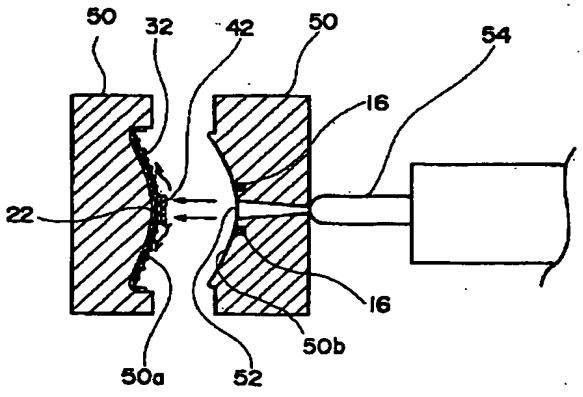

【図８】